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Surgical Instruments in Gynaecology

Instrument	Features	Examples
Allis forceps	It is used to grasp touch structures	• Holding the cervix during dilation and curettage • Holding edges of the vagina during hysterectomy • Holding rectus sheath during abdominal surgery • Grasping of the ovary and tubo-ovarian masses in case of oophorectomy
Babcock Forceps	It is used to grasp delicate structures (e.g. tube, appendix, bowel)	Holding the Fallopian tubes during tubal sterilization and salpingectomy
Ramsey forceps	It is used to grasp tissue edges (toothed and non-toothed)	• Non-toothed forceps is used to inside peritoneal cavity • Toothed forceps is used to grasp skin edges during skin closure
Tissue holding forceps	It is used to grasp and retract tissues for long period of time (Littlewood and lanes tissue forceps)	Littlewood tissue forceps is used to grasp the edges of the rectus sheath to aid dissection and during closure
Green Armytage uterine haemostatic forceps	It is used to hold tissue edges	Holding uterine edges to facilitate closure of hysterotomy incision during caesarean section
Polyp forceps	It is used to grasp	Used to grasp and avulse uterine and cervical polyps

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	tissues firmly for removal	(polypectomy)
Rampley sponge forceps	It is used to hold a gauze swab for the purpose of cleaning	A swab on a stick is used to prep the skin or to dab blood in tissues without damaging them
Doyens retractor	A broad and short abdominal retractor	It is used to retract the bladder during caesarean section
Langenbeck retractor	Light and small retractors	It is used to retract the skin during closure of rectus sheath during caesarean section (commonly used in pairs)
Morris retractor	Right angle retractors	Used to improve visualization during pelvic surgery
Balfour retractor	Self-retaining abdominal retractor	Used during abdominal surgery to provide adequate exposure
Auvard speculum	Self-retaining vaginal retractor	It may be used in dilation and curettage and other pelvic procedures
Vulsellum forceps	It is used to grasp tissues firmly (single-toothed, double-toothed or multiple toothed)	• Used to grasp the cervix during vaginal hysterectomy • May be used to grasp a fibroid polyp
Haemostatic clamps	They are atraumatic causing minimal tissue trauma, and serrated so they prevent slippage (Gwilliams and Rogers)	Used during hysterectomy to clamp vascular pedicles
Haemostatic forceps	They have a strong grip and sharp teeth (Kocher, Spencer Wells)	• Used to compress bleeding vessels and help haemostasis (Spencer Wells) • Used to clamp the cord before dividing

Office Hysteroscopy

Prior to procedure

- Patients should be counselled on the procedure, its value and limitations. Written information should be supplied
- Nurse chaperone should be present regardless of provider gender

Cervical preparation

- Routine cervical preparation is not indicated
- Routine cervical dilation during the procedure should be avoided

Sedation

- Conscious sedation should not be routinely used

Anaelgesia

- Non-steroidal anti-inflammatory drugs (NSAIDs): should be given 1 hour before the procedure. Routine preoperative opiate should be avoided
- Local anaesthetics:
    - Instillation into the cervical canal may be associated with lower risk of vasovagal reaction but not pain
    - Application of local anaesthetic into and around the cervix decreases procedure-related pain

These options should be considered particularly in postmenopausal women. In premenopausal women, it may be considered only if cervical dilation is anticipated or if a scope larger than 5 mm should be used. Routine use in premenopausal women to reduce incidence of vasovagal reaction is not indicated

- Topical applications of a local anaesthetic to ectocervix is indicated if a tenaculum will be used during the procedure

Equipment

scopes	• Hysteroscope miniature scope has a diameter of 2.7 mm (with 3.5mm sheath) • flexible scopes are associated with less pain, better image, quicker exam, fewer failed procedures, and less cost compared to rigid scopes
lenses	• They are available at angles zero, 12°, 25° or 30° off-set lenses • There is no evidence of superiority of one lens type (operator choice)
distention media	• Carbon dioxide versus normal saline • Normal saline is associated with better image quality, less vasovagal attacks, and quicker procedure • Normal saline is used if bipolar electrosurgery will be used for operative procedures

Approach

Vaginoscopy is associated with less pain particularly when rigid outpatient hysteroscopy is used. It should be performed routinely specially if:

- Speculum insertion/cervical instrumentation is difficult
- Blind endometrial biopsy is not required

Laparoscopic Entry Complications

Incidence

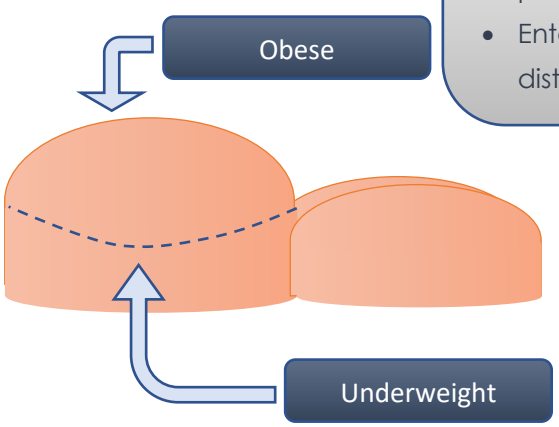
- Incidence of all complications is 1-12:1000
- Incidence of major complications is 1.4/1000:
  - Intestinal injury: 0.6/1000
  - Urologic injury: 0.3/1000
  - Vascular injury: 0.1/1000

Risk factors

- Obese or underweight
- Midline abdominal incision
- Inflammatory bowel disease
- Peritonitis

Prevention

- Open technique or palmer's is superior to Veress technique.
- If Veress needle is used, a standard Veress length may be used (the distance between umbilicus to peritoneum is 6 cm
- Entering at 45 degree would result in longer distances to enter the abdomen



- There is high risk of vascular injury. The risk is higher in young and nulliparous women with well-developed musculature.
- If a patient is severely underweight, aorta may be < 2.5 cm deep to umbilicus.
- Hasson technique and Palmer's points are referred

Safe entry of primary port

Closed technique

- Small superficial vertical incision at base of the umbilicus.
- Check the spring action of Veress needle.
- Entry is performed while patient is in horizontal position (not Trendelenburg)
- Palpate the abdomen to check for masses and position of the aorta.
- Veress is inserted perpendicularly while lower abdominal wall is stabilized
- Two clicks should be audible (entry of fascia, peritoneal entry).
- To ensure successful entry, initial insufflation pressure should be < 8 mmHg with free flow.
- Excessive lateral movement of the needle should be avoided, otherwise, a potential tear may be expanded.
- Insufflation through the needle should continue till pressure is 20-25mmHg. At this pressure, aorta is 4-8 cm away from the umbilicus (only 0.6 cm if pressure is 10 mmHg).
- Thereafter, primary trocar can be inserted perpendicularly. Once all trocars are placed, pressure should be dropped to 12-15 mmHg (which is ideal for good visualization and proper patient ventilation).
- The scope is inserted through the primary cannula and rotate inside the abdomen (360°) to check any injuries, bleeding or adhesions.
- If adherent bowel at the umbilicus, the trocar may be inserted under vision using 5 mm scope PLUS visual control during removal to ensure no bowel injury.

Open technique

- An incision is made through the umbilicus till peritoneum is open (as confirmed by visualizing omentum or bowel).
- Lateral stay sutures should be taken at fascial edges
- A blunt-tipped cannula is inserted. Stay sutures are firmly attached to suture holders of the cannula (airtight seal).
- The abdomen is partially distended and then, the trocar is withdrawn.
- At the end of the procedure, fascia is closed using these stay sutures with or without additional stitches to reduce risk of incisional hernia.

Alternative entry techniques

Direct trocar entry

If a surgeon is experienced in this technique, it is not associated with significant difference in major complications compared to closed technique.

Optical insertion

The technique is not superior to other techniques

Palmer's point

- This technique is recommended in the presence of previous abdominal surgeries. Umbilical adhesions are present in **50%** of patient after midline vertical and **25%** after low transverse
- The point is 3 cm below the left costal margin at midclavicular line.
- A Veress needle is inserted, pressure is raised to to 25 mmHg then a 2-5 mm scope is used to assess periumbilical adhesions
- In no adhesions found, umbilical access is done, otherwise, adhesiolysis is performed first.

Other entries

- Entry through fundus **(risk on injury to adherent bowel)**
- Entry through DP **(risk of injury to adherent rectum e.g. deeply infiltrating endometriosis)**
- Suprapubic access **(risk on bladder injury)**

Safe entry of secondary port

- Secondary ports should be Inserted under direct vision. They should be perpendicularly inserted
- IAP should be 20-25mmHg prior to insertion
- Prior to insertion, IE vessels should be identified prior to entry (lateral to medial umbilical ligaments "obliterated umbilical arteries")
- If IE vessels cannot be seen e.g. obese patients, trocars should be inserted lateral to lateral border of rectus sheath.
- Insertion direction is perpendicular. Once the trocar passes through the peritoneum, trocar should be angled toward anterior pelvis to avoid injury to pelvic sidewall vessels.

Safe exit of secondary ports

- Ports should be removed under direct vision to rule out bleeding from entry site
- Closure of any midline abdominal incision longer than 10 mm or non-midline incision longer than 7 mm should include fascial closure to reduce risk of incisional hernia

DP: Douglas pouch
IAP: Intra-abdominal pressure.
IE: Inferior epigastric

Abdominal Incisions and Closure

Types of abdominal incisions

- Transverse incisions
- vertical incisions
- oblique incisions

- Do not use monopolar electrosurgical device to make abdominal incision
- Scalpel are used to make abdominal incision. Changing scalpel when making superficial and deep incisions is not necessary

Incision	Advantages	Disadvantages	Types
Transverse incisions	• Best cosmetic results • Less postoperative pain painful • Less interference respirations during recovery • Greater strength on healing	• More time-consuming • Associated with more bleeding • Inadequate exposure of upper abdominal cavity • Incision through several layers of fascia and muscle • Possible incision through abdominal wall nerves • May create potential spaces that result in hematomas or seroma	• **Pfannenstiel incision:** ▪ Incision is curved ▪ 10–15 cm long ▪ 2 cm above pubic symphysis ▪ Rectus muscles are split but not cut • **Küstner incision:** ▪ Incision is slightly curved ▪ Incision starts below level of ASIS and passes just below pubic hairline. ▪ Incision has limited extensibility ▪ It may be associated with superficial branches of the inferior epigastric artery or vein • **Cherney incision:** ▪ Rectus muscle is incised at its insertion to pubic symphysis

			▪ It allows access to space of Retzius and is used in urinary incontinence procedures ▪ It is also suitable for hypogastric artery ligation • **Maylard incision:** ▪ Incision is 3–8 cm above the symphysis ▪ All muscle layers of lower abdominal wall are transversely cut ▪ Rectus fascia is not dissected free of rectus muscles ▪ Peritoneum is incised transversely • **Mouchel incision:** ▪ Incision is made at upper limit of pubic hair (below Maylard incision) ▪ Abdominal muscles are divided above the openings of the inguinal canals. • **Joel-Cohen incision:** ▪ Straight incision 3 cm below the level of ASIS ▪ Subcutaneous tissues and fascia are incised transversely in the midline. Incision is bluntly extended laterally with blunt finger dissection. ▪ Rectus fascia is dissected bluntly from muscle layer, rectus muscle is split, and peritoneum is opened

Vertical incisions	• Excellent abdominal exposure • Easy to extend • Less bleeding • Nerve injury is unlikely • Time saving	• Incidence of wound dehiscence and hernia may be higher • Less favorable cosmetic results	• **Midline (median) incision:** ▪ It can be easily extended ▪ Perfect exposure ▪ Pyramidalis muscle is a landmark to identify the midline • **Paramedian incision:** ▪ It is extensible especially on the side of the pelvis ▪ No difference in wound infection, dehiscence or postoperative respiratory difficulty with midline and paramedian incisions. ▪ Paramedian incisions may be associated with more bleeding, and operative time
Oblique incisions	• Gridiron incision allows extraperitoneal abscess drainage (no peritoneal contamination) and provides access to appendicectomy in pregnant women	Limited exposure	• **The Gridiron incision:** ▪ Incision starts at McBurney point and passes downward and inward ▪ Abdominal wall muscles are split along the direction of the fibres. • **Rockey–Davis incision:** ▪ Transverse incision ▪ It is done at junction of the middle and lower thirds of a line drawn between ASIS and the umbilicus.

ASIS = anterior superior iliac spine

Joel-Cohen Vs. Pfannenstiel incision

In Caesarean section, Joel-Cohen is superior:

- It is associated with less postoperative febrile morbidity
- It is associated with less postoperative pain and need for analgesia
- It is time saving
- It is associated with less intraoperative bleeding and adhesion formation
- It is associated with fewer rate of wound infection and shorter hospital stay

- **Electrosurgery:**
  - It should not be used to create skin incision (skin blistering and poor healing due to desiccation effect)
  - Tissues can be incised using electrosurgery. A small/thin electrode is used, with cut current, that should be activated just before the tissue is reached
  - Abdominal fat can be cut using electrosurgery. A coagulation waveform should be used

Closure of abdominal incision

- **Principles of suturing skin incisions:**
  - Debridement of skin edges must be done whenever necessary
  - Direct tissue trauma should be avoided
  - Skin edges should just touch each other. Skin should not be blanched

- **Closure techniques:**

Primary suture line

This refers to continuous or interrupted sutures that approximates wound edges during healing by first intention

- Continuous suture: less foreign body mass in the wound, event distribution of tension.
- Interrupted sutures: better in the presence of infection. Therefore, a suture break does not open the whole incision

No difference in continuous versus interrupted closure in wound breakdown and hernia formation

Secondary suture line

- Also known as retention sutures
- Used to reinforce the primary suture line and close any dead space
- Retention sutures are placed 2 inches from wound edge

Fascial closure

- The incision is sutured continuously
- If incision extends laterally beyond the edge of rectus muscles into external and internal oblique muscles, this may be associated with injury to ilio-hypogastric and ilioinguinal nerves
- So, if these extensions are present, sutures should be carefully placed so they incorporate external oblique fascia only

Closure of unclean wounds

Secondary closure

- It is used more often to manage contaminated or dirty wounds
- Wound is cleaned first, then, it is allowed to heal by secondary intention without stitches

Delayed primary closure

- It is occasionally used for contaminated or dirty wounds
- First, the wound is cleaned, then, it is reassessed after a few days to rule out infection, then the wound is surgically closed
- In this case, staples or monofilament delayed sutures or non-absorbable sutures may be used

Layered versus mass closure

- Mass closure using looped delayed–absorbable suture is superior to conventional layered closure
- Suture length: wound length ratio should be at least 1:4

Smead–Jones closure

- Anterior wall mass closure is performed using a far–far (1.5–2 cm from fascial edges), near–near (only anterior fascia) technique
- Sutures are either interrupted or running using delayed absorbable suture.
- Fascial dehiscence rate with this technique is 0.4%.

Gallup closure

- This technique is used to close midline incisions
- No. 2 polypropylene suture is run 1.5–2 cm from the fascial edge
- The suture includes peritoneum, fascial layers and the intervening muscles.
- One suture run from each end of the wound and they are tied in the middle where they meet. The knot consists of 3 square knots

Incisions and closure in obese patients

Morbid obesity is associated with 7-fold increased risk of wound infection

- Skin incision:
  - Transverse incision: should be made away from the moist subpannicular fold to reduce risk of infection
  - Midline vertical incision: panniculus should be retracted inferiorly to avoid the moist area
- Abdominal wall closure:
  - Smead–Jones closure
  - Running mass closure
- Intra-fascial drain:
  A drain is placed and monitored for drain output. The drain is removed if output is <50 ml/24 hours
- Skin closure: staples are superior to subcuticular sutures

Laparoscopic incisions and closure

- **Primary incision:**
  - Incision is made below vertically in the midline
  - Incision is made from the base of the umbilicus, and not below it

- **Closure:**
  - Laparoscopic incisions require skin closure
  - Non-midline incisions > 7 mm and midline incisions >10 mm require deep sheath closure to reduce risk of port site hernia

Wound closure materials

The following options are available for closure

Sutures

Suture materials used for closure are:

- non-absorbable sutures: e.g. polypropylene suture
- Slowly absorbable sutures: e.g. Poliglecaprone 25 suture
- rapidly absorbable sutures e.g. polyglactin 910 suture

Monofilament sutures are associated with less risk of infection (less likelihood of bacterial overgrowth) e.g. Poliglecaprone 25

Staples

Types of staples are:

- **Non-absorbable staples:** stainless steel staples (high tensile length and tissue reaction)
- **Absorbable staples:** Associated with low risk of infection. They retain 40% of tensile strength at 14 days and take months to absorb (half-life is 10 weeks)

Staples are associated with lower incidence of infection compared to sutures when used to close contaminated wounds

However, they may cause track formation and allow bacterial migration into the wound

Adhesives and glues

Types:

- **Biological agents:** e.g. fibrin-based glues, gelatin-based hydrogels, and composite glues
- **Synthetic agents:** cyanoacrylates and polymeric sealants
  - **Non-resorbable:** limited to surface applications
  - **Resorbable (biodegradable):** for external and internal use
- **Genetically engineered protein glues**

Adhesive strips

- Adhesive strips are used after wound is closed with sutures (subcuticular sutures)
- It is used to approximate wound edges and reduce wound tension. This tends to improve wound cosmesis
- Adhesive strips are not used as a primary method of wound closure

Adhesives and glues are fast to use, cyanoacrylates show antimicrobial features

Tapes are easy to apply but are not suitable for moist and mobile areas (detach). They are not an alternative to sutures

Suture materials

Suture Material	Absorption Time in Days	Structure
Polyglycolic acid (Dexon)	90-120	Monofilament
Polyglactin (Vicryl)	60-90	Multifilament
Polyglactic 910 (Vicryl Rapid)	7-14	Multifilament
Polydioxanone (PDS)	180-210	Monofilament
Polyglecaprone (Monocryl)	90-120	Monofilament
Polytrimethylene carbonate (Maxon)	180-210	Monofilament

Hysterectomy

Abdominal hysterectomy

Steps of abdominal hysterectomy are:

- Laparotomy with good exposure of surgical field
- Cut and ligate the round ligament
- Clamp, cut, and ligate the ovarian ligament (if the ovaries will be preserved), or the infundibulopelvic ligament (if oophorectomy is indicated)
- Dissect the broad ligament down to the side wall of the uterus toward uterine vessels
- Mobilize the bladder
- Clamp, cut, and ligate uterine vessels
- Clamp, cut, and ligate the uterosacral ligaments
- Incise the vagina and remove the uterus
- Close the vaginal cuff

Vaginal hysterectomy

Steps of vaginal hysterectomy are:

- A circumferential incision is made in the cervix
- The bladder is dissected upwards
- The anterior peritoneum is opened (through the utero-vesical peritoneal fold)
- The posterior peritoneum is opened (through the pouch of Douglas)
- The uterosacral ligaments are cut and ligated
- The uterine arteries are cut and ligated
- The round ligaments are cut and ligated

- The tubes and ovaries may be removed at this stage
- The uterus and cervix are removed
- McCall culdoplasty is performed to prevent enterocele
- The cardinal and uterosacral ligaments are incorporated in closure of vaginal vault

Complications

Serious risks	Incidence
Overall risk of serious complications	4:100 (common)
Bladder and/or ureter injury – Disturbance of bladder function	7:1000 (uncommon)
Bowel injury	4:10000 (rare)
Haemorrhage requiring blood transfusion	23:1000 (common)
Return to the theatre	7:1000 (uncommon)
Pelvic abscess/infection	2:1000 (uncommon)
Venous thrombosis or pulmonary embolism	4:1000 (uncommon)
Death within 6 weeks	32:100000 (rare)

Frequent risks include wound infection, incisional pain, delayed wound healing or keloid formation, paresthesias, and urinary tract infection

Enhanced Recovery in Gynaecology

Preoperative phase

- Preoperative risk assessment to improve surgical outcomes
- Determination of location of immediate postoperative recovery based on surgery and individual risks e.g. elective admission to high dependency care or intensive care unit
- Preoperative education, verbal and written information, which covers surgery, postoperative care, hospital stay, and pain control
- Discharge plan, with availability of appropriate support

Perioperative phase

- Clear fluids should be stopped 2 hours prior to anaesthesia
- Preoperative carbohydrate drinks, in non-diabetics, reduced postoperative thirst, hunger, anxiety, and insulin resistance
- Mechanical bowel preparation is not recommended
- Long-acting sedative premedication are not recommended to facilitate early mobilization
- Intraoperative hypothermia should be prevented
- Prophylactic antibiotics should be used according to the procedure
- Mechanical and pharmacological thromboprophylaxis (as indicated)
- Nasogastric tube should be avoided
- Vaginal and abdominal drains should be avoided
- Vaginal packs should be avoided whenever possible (interfere with early immobilisation)
- Postoperative pain strategies (e.g. spinal, epidural, and regional approaches) are highly recommended to reduce the need for postoperative narcotics

Postoperative phase

- Early feeding and reduction of IV fluid infusion is recommended to avoid nausea and to shorten hospital stay
- Early immobilisation should be encouraged through effective analgesia
- Anti-emetics with laxatives should be used proactively
- Early catheter removal and monitoring of voiding and post-voiding residuals to ensure good bladder function

Discharge

- Discharge criteria:
  - Immobilisation
  - Pain is well controlled with no or oral analgesics
  - Patient is passing flatus
  - Patient can drink and eat regular eat
- Laxatives are prescribed and should be used till the patient has her first bowel movement
- Patients can be discharged with the urinary catheter in place. Education on urinary catheter care should be delivered to the patient

Prevention of Surgical Site Infection

Strategies to prevent surgical site infection are classified into pre-operative, intra-operative and post-operative phases as follow:

Pre-operative phase

For patient

For staff

1. showering

Showering or having a bath with soap the day before or on the day of surgery

2. Nasal decolonization

If the risk of staph aureus surgical site infection is high, nasal mupirocin with chlorhexidine body wash are recommended based on:

- The type of procedure.
- Individual patient risk factors.
- The increased risk of side effects in preterm infants.
- Potential impact of infection
- Maintain surveillance on resistance to mupirocin.

- All staff should wear specific non-sterile theatre wear in all areas.
- Movements in and out of the operating area should be kept to a minimum

❸ **Hair removal**

- Don't remove hair routinely. but if it is necessary, use electronic clippers with disposable heads.
- Don't use Razors as they increase the risk of surgical site infection

❹ **Patient theatre wear**

There should be specific theatre wear that allows easy access and maintains comfort and dignity

❺ **Mechanical bowel preparation**

It's not needed routinely to prevent surgical site infection

❻ **Accessories**

Jewelry, nail polish, and artificial nails should be removed before surgery

❼ **Antibiotic prophylaxis**

- A Single dose of antibiotics is given when anaesthesia is induced (or earlier if a tourniquet will be used)
- A second dose is given if surgery is longer than the half-life of the antibiotic
- Antibiotic treatment in addition to prophylaxis is needed for infected/dirty wounds.
- Inform patients about the use of antibiotics.

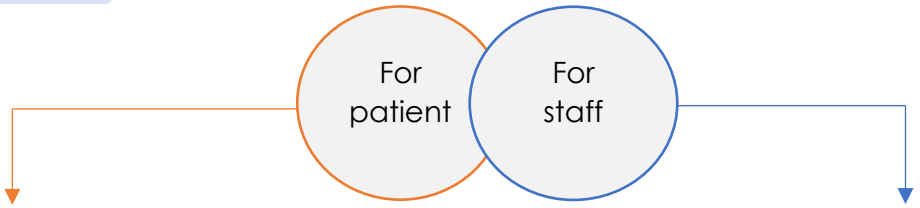
Indications of prophylactic antibiotics

① clean surgery only if involves the placement of implant/prosthesis and not used for clean uncomplicated surgery without implants

② Clean-contaminated surgery

③ contaminated surgery

Intra-operative phase



1 Incise drapes

Use iodophor impregnated drapes unless the patient has an iodine allergy

2 Antiseptic skin preparation

- Use antiseptic preparation to clean the incision immediately before surgery
- Be aware of the risk of skin antiseptics on babies due to the risk of chemical injury of chlorhexidine with both alcohol and aqueous solution.

Hand decontamination

- Before the 1st operation on the list, wash hands with an aqueous antiseptic solution with a single-use brush or pick for nails.
- next time, use alcoholic hand rub or antiseptic solution but if soiled, wash again with an antiseptic solution.

Sterile gowns and gloves:

The operating team should Wear sterile gowns and 2 pairs of gloves if the risk of glove perforation and sequences of contamination is high.

Types of antiseptic skin Preparation	Usage
An alcohol-based solution of chlorhexidine	First choice
An aqueous solution of chlorhexidine	In Surgical site is next to mucous membranes
An alcohol-based solution of povidone-iodine	If chlorhexidine is contraindicated
An aqueous solution of povidone-iodine	If both an alcohol-based solution and chlorhexidine are contraindicated

3 Diathermy

- Do not use it for a surgical incision to decrease the risk of surgical infection.
- If diathermy is used, use vaporization to dry antiseptics and avoid pooling alcohol-based preparations.

4 Homeostasis

- Maintain patient temperature during surgery
- Maintain adequate perfusion during surgery and O2 saturation >95% during surgery and recovery

5 Closure methods

- Consider using sutures rather than staples to close skin to decrease surgical site infection in the caesarean section
- Antimicrobial triclosan-coated sutures especially for paediatric surgery reducing surgical site infection

6 Wound dressings

Cover surgical incisions with appropriate interactive dressing at the end of surgery

Wound irrigation and intracavity lavage are not recommended.

Antiseptics and antibiotics applied before wound closure should not be used outside clinical trials

post-operative phase

1. **Changing dressings**
   - Use the anti-septic anti-touch technique to change or remove the dressing
2. **Postoperative cleansing**
   - Use sterile saline for wound cleansing up to 48 hours after surgery.
   - patients can shower safely 48 hours after surgery.
   - Tap water is used to cleanse wounds after 48 hours if separated or for draining pus.
3. **Dressings for wound healing by secondary intention**
   - Do not use Eusol, gauze, or moist cotton gauze or mercuric antiseptic solutions. Do not use dextranomer, enzymatic treatment for debridement
   - Use appropriate interactive dressing.
   - Ask tissue viability nurse for appropriate dressing

Topical antibiotics for wound healing by primary intention It's not recommended.

Do not give insulin routinely to non-diabetics to adjust postoperative glucose level.

Laparscopic Vascular Injuries

Risk of vascular injuries

Vessels at risk in laparoscopic gynaecological surgery include:

Inferior epigastric artery	There is a 'safe zone' where ports can be inserted with a low likelihood of injuring the inferior epigastric artery. This could be from <1 cm from the midline or >8 cm from the midline. Insertion of ports more than two-thirds along the line between the midline and the anterior superior iliac spine will also fall in this 'safe zone'
Aorta	The insertion of the Veress needle and first trocar should be in the supine position before raising the legs into the Trendelenburg position
Common iliac arteries	Right common iliac artery is at higher risk of injury during instrumentation of the umbilicus
Venous system	An injury to the vena cava is more likely when a trocar is inserted next to the midline instead of in the midline. The left iliac vein crosses the midline caudal to the umbilicus and can be injured even by a midline trocar. Sharp and blunt dissection can cause bleeding as well
Corona mortis	It is an anastomosis between the obturator and the external iliac or inferior epigastric arteries or veins situated behind the superior pubic ramus, which may be injured during pelvic lymphadenectomy

Prevention

Key considerations for reducing vascular injury in laparoscopic gynaecological surgery:

- **Preoperative assessment:**
  - In the elective setting, appropriate preoperative assessment, including identification and treatment of anaemia.
  - In the emergency setting, availability of transfusable blood and cell salvage consideration.

- **Laparoscopic abdominal entry techniques:**
  - Seventy-five percent of vascular injuries occur at the time of entry using either a Veress needle or primary trocar.
  - The RCOG Green-top Guideline recommends open entry or use of Palmer's point in women with a low body mass index to reduce the risk of posterior abdominal wall vascular injury
  - Abdominal pressure:
    - The RCOG recommends an alternative method of entry, either open Hasson or Palmer's point, after 2 unsuccessful attempts to insert the Veress needle via the umbilicus.
    - High abdominal pressures should only be used during initial entry before reducing the pressure to 10–15 mmHg.
  - Previous surgery:

    Previous surgery is a risk factor for complications in further laparoscopy. Periumbilical adhesions are present in 52% with previous midline laparotomy.

Safe abdominal entry techniques

- Use the entry technique with which you are most familiar
- Avoid previous scars when choosing the entry point
- Make an adequate skin incision to avoid the need for the use of excessive pressure to pass the trocar through the skin
- If using the Veress needle, insert it vertically and stop insertion as soon as the peritoneum is penetrated
- Consider insertion of Veress and primary trocar with the woman in a supine rather than Trendelenburg position
- Increase the pneumoperitoneum pressure to at least 20 mmHg before inserting trocars
- Consider open technique or Palmer's point entry in women with a low body mass index or previous surgery

- **Instruments:**
  Unintended electrosurgical arcs can occur from monopolar instruments or thermal injury from excessive use of energy devices.

- **Camera angle:**
  Surgeons and their assistants should be encouraged to keep the camera tilt as close to zero.

Management

Signs of vascular injury during laparoscopy

- Retroperitoneal haematoma (stable or enlarging in size) may be seen superior to the sacral promontory area
- Active bleeding coming directly from the major vessels
- Free blood in the abdominal cavity
- Haemodynamic instability

- **Anterior abdominal wall vascular injury:**
  - The most common vascular injury overall is laceration of the inferior epigastric artery during placement of lateral trocars in the lower abdomen.
  - Bleeding may present immediately or delayed after 2-3 days in the form of abdominal wall hematomas causing pain, abdominal wall or flank ecchymosis.
  - Techniques to control immediate bleeding:
    ① Electrosurgery to coagulate the bleeding point.
    ② A Foley catheter may be inserted through the port site, and the balloon inflated in the peritoneal cavity. The balloon can then be pulled up against the bleeding point with a resultant tamponade effect.
    ③ The lacerated inferior epigastric vessels can be sutured using an Endo CloseTM suture, a straight needle or intracorporeal suturing.
    ④ Conservative management should be done if the woman has an abdominal wall haematoma but is hemodynamically stable.

⑤ Percutaneous embolisation of the bleeding vessel can be undertaken if interventional radiology is readily available.

⑥ Conversion to open surgery may be considered for rapidly expanding haematomas or haemodynamically unstable patients.

- **Posterior abdominal wall vessel injury:**

Injuries to the posterior abdominal wall vessels are potentially life-threatening vascular injuries. When the patient is haemodynamically compromised and a major vascular injury is suspected or diagnosed, then immediate conversion to midline laparotomy is advised.

- **Immediate action following a major vascular injury:**

① Declare a major vascular emergency:

All team members must realise this is a potentially life-threatening emergency.

② Arrest the bleeding with direct pressure:

- Major vascular injury usually requires a midline laparotomy; and laparoscopy depends on the operator experience.
- A multidisciplinary team approach is advocated, seeking senior surgical help (vascular or general surgery input).
- Leaving the trocar that caused the injury in place rather than removing it will limit blood loss while preparations can be made.
- If vascular injury below the bifurcation of the aorta is suspected but not visible clearly and laparotomy is considered, direct pressure on the vessel using laparoscopic instruments.
- External pressure on the aorta just underneath the xiphisternum may decrease further blood loss.

③ Communicate effectively with the team:

Anaesthetist colleagues may delegate a member of the team to communicate with the switchboard and blood bank to announce the major haemorrhage protocol to obtain high priority blood products.

④ Resuscitate and continue fluid resuscitation:

The anaesthetic team secures sufficient peripheral access to give fluids/emergency medication. An indwelling catheter inserted to assist with fluid balance management.

⑤ Monitor and investigate:

- More invasive monitoring in the form of arterial/central lines.

- Blood can be taken for urgent full blood count, urea and electrolytes, liver function tests, coagulation screen and crossmatch samples.

⑥ Other considerations:

- Closing theatre doors helps to keep the environment relatively relaxing.
- keep on top of swab counts and empty clinical bins.
- Theatre staff can obtain more appropriate equipment such as laparotomy/vascular sets.
- Inform and update the woman's partner or family members

⑦ Risk management:

- A team member needs to scribe all that is occurring in time sequence.
- An incident form will need to be completed once the medical emergency ended.
- Retrospective documentation from all staff members is extremely useful

Postoperative care

- **Immediate postoperative period:**
  - Fluid balance and haemodynamic stability must be closely monitored in an intensive care unit/high dependency unit.
  - Antibiotics may be required if there is evidence of infection or as prophylaxis.
  - The risk of venous thromboembolism should be assessed and consideration given for the need for thromboprophylaxis mechanical initially.

- **Later postoperative care:**
  - A thorough debrief with the woman and her family to explain the complications.
  - In the case of major vessel injury in women of reproductive age, advice to avoid pregnancy for several months to allow successful healing before the haemodynamic challenge of pregnancy.

Nerve Injuries in Gynaecologic Surgery

Mechanism of injury

Type of injury	Example
Compression and stretch injuries	• Improper placement of self-retaining retractors e.g. Balfour retractors, prolonged positioning in stirrups
Transection injuries	Incorrectly sited surgical incisions: • Pfannenstiel and low transverse incisions extending beyond the lateral margin of the inferior rectus abdominus muscle can cause injury to lateral cutaneous branches of iliohypogastric and ilioinguinal nerves. The risk is highest if the incision is below anterior superior iliac spine (ASIS) and 5 cm superior to pubic symphysis
Entrapment nerve injuries	• This most commonly occurs with pelvic floor reconstruction surgery • Risk of chronic nerve-related pain with Pfannenstiel incisions (7%) due to entrapment of ilioinguinal and iliohypogastric nerves

Lumbosacral injury

Nerve	Anatomy	Cause of injury	Presentation
Femoral nerve	• L2-L4 (It passes infero-laterally through psoas muscle and emerges from its lateral border. It exits the pelvis beneath	• The most common cause is abdominal hysterectomy (compression of nerve against the pelvic sidewall as it emerges	• It is the most common gynaecological associated neuropathy (11%)

	the inguinal ligament, lateral to femoral vessels)	from lateral border of psoas by excessively deep retractor blades: ▪ Incidence of nerve injury with self-retaining retractor is 8% (versus < 1% if not used) • Inappropriate positioning: hyperflexion, abduction, and external rotation of hip result in kinking of the femoral nerve under the inguinal ligament	• It results in loss of sensation over the anterior and medial thigh and medial calf • Hip flexion, adduction, and knee extension are affected • Inability to climb stairs is a characteristic feature
Ilioinguinal and iliohypogastric nerves	• They originate from T12-L1; both are sensory ▪ Iliohypogastric nerve pierces external oblique aponeurosis above superficial inguinal ring, ilioinguinal nerve emerges through it	▪ Injury is caused by suture entrapment at lateral borders of low transverse or Pfannenstiel incisions. ▪ Incidence of nerve injury following Pfannenstiel incision is 3.7%	• Ilioinguinal nerve: loss of sensation over mons, lateral labia, and upper inner thigh • Iliohypogastric nerve: loss of sensation
Genitofemoral nerve	• It originates from L1–L2 ▪ It traverses the anterior surface of psoas and lies immediately lateral to external iliac vessels	The most common cause of injury is pelvic side wall surgery and during removal of the external iliac lymph nodes	Loss of sensation over the labia and femoral triangle

	▪ It divides into a genital branch, which enters deep inguinal ring, and a femoral branch, which passes deep to the inguinal ligament within femoral sheath		
Lateral cutaneous nerve of the thigh	▪ It originates from L2–L3 ▪ It emerges from lateral border of psoas → crosses iliac fossa anterior to iliacus → enters thigh posterior to lateral end of inguinal ligament	During pelvic surgery (similar to causes of femoral nerve injury)	Loss of sensation over anterior and posterolateral thigh
Obturator nerve	▪ It originates from the anterior branches of L2-L4 ▪ Nerve converges behind the psoas muscle then passes over pelvic brim anterior to sacroiliac joint and posterior to common iliac vessels to enter the thigh via obturator foramen	▪ Retroperitoneal surgery ▪ Excision of endometriosis ▪ Passage of a trocar through obturator foramen ▪ Insertion of trans-obturator tapes ▪ During paravaginal defect repairs	▪ Loss of sensation over upper medial thigh ▪ Loss of thigh adduction (minor ambulatory issues)
Sciatic and common	▪ It originates from L4 to S3	▪ The most common site of injury for sciatic	▪ Loss of sensation below the knee

peroneal nerves	▪ It emerges from the pelvis below piriformis muscle, curving laterally and downward through the gluteal region ▪ Common peroneal nerve and tibial nerve emerge at mid-thigh ▪ Common peroneal nerve curves anteriorly around neck of the fibula	nerve is the sciatic notch ▪ The most common site of injury for peroneal nerves is the lateral aspect of fibular neck ▪ The most common cause of injury is improper lithotomy positioning with hyperflexion of thighs ▪ Common peroneal nerve may be compressed at the fibular neck in lithotomy position	except the medial foot ▪ Loss of hip extension and knee flexion
Pudendal nerve	▪ It originates from S2 to S4 ▪ It exits the pelvis through the greater sciatic foramen below the piriformis ▪ It runs behind lateral third of sacrospinous ligament and ischial spine alongside internal pudendal artery and immediately re-enters the pelvis through lesser sciatic foramen to pudendal canal (Alcock's canal)	The most common cause is entrapment injuries during sacrospinous ligament fixation (the nerve runs behind lateral aspect of sacrospinous ligament)	▪ Loss of sensation over the perineum ▪ Nerve entrapment causes postoperative gluteal, perineal and vulval pain, it worsens in the seated position if the nerve is damaged

Brachial plexus injury

- **Anatomy:**
  - The brachial plexus originates from nerve roots C5–T1
  - It supplies the upper limb and lies within the posterior triangle of the neck

- **Causes of brachial plexus injuries:**

  Stretch injury is the most common cause of brachial plexus injury

Nerve or root	Cause of injury	Clinical features
Upper root of brachial plexus (C5-6)	Hyperabduction of the arm e.g. ▪ When arm boards are extended beyond 90 degrees from the long axis of operating table ▪ When an arm unintentionally falls from the arm board	▪ Erb's palsy or 'waiter's tip' deformity ▪ It consists of loss of shoulder abduction, loss of flexion of the elbow and supination
Lower root of brachial plexus (C8–T1)	Lower roots may be stretched if shoulder braces are used during laparoscopic surgery (to support in steep Trendelenburg position)	▪ Klumpke's palsy (claw hand) ▪ Loss of sensation over medial arm, forearm and medial 2 fingers
Radial nerve (C5-T1)	Pressure on the humerus during arm positioning may cause radial nerve compression (radial nerve winds around a spiral groove on the back of the humerus)	▪ Loss of wrist and finger extension ▪ Loss of sensation over the dorsal tips and lateral 3 and half fingers
Ulnar nerve (C8-T1)	▪ Undue pressure over the medial aspect of elbow during arm board positioning causes ulnar nerve compression around the medial epicondyle (ulnar nerve enters the forearm posterior to medial epicondyle of humerus)	▪ Claw hand ▪ Loss of sensation over the medial 1 and half fingers

Diagnosis of nerve injuries

- Diagnosis is made by neurological examination and electromyography (EMG)
  If neuropathy is diagnosed, refer to a neurologist
- EMG should be performed 3–4 weeks after suspicion of nerve damage (denervation of afflicted muscle)

Treatment of nerve injuries

- **Conservative management:**
  Most neuropathies will resolve spontaneously with minimal intervention
  - Sensory neuropathies resolve within 5 days
  - Motor deficits may take up to 10 weeks
  - Occasionally neuropathies may persist beyond 1 year
- **Painful neuropathy:**
  - It often responds to medications e.g. tricyclic anti-depressants and GABA antagonists
  - Failure to resolve is rare after 6 months. In persistent cases, local nerve blockade or even surgical nerve excision or decompression can be considered
- **Motor impairment:**
  Physiotherapy should be considered to manage motor impairment, secondary to retraction or stretching
- **Nerve repair:**
  Failure to resolve e.g. complete nerve transection may require specialist repair e.g. microsurgical techniques (e.g. repair of transected obturator nerve has an excellent prognosis)

Prevention of nerve injuries

- **Identification of women at higher risk:**
  - Thin body habitus
  - Ill-developed abdominal wall muscles
  - Narrow pelvis
  - Surgery > 4 hours
  - Surgery > 2 hours in lithotomy position

- **Avoidance of nerve compression by self-retractor blades:**

  The following interventions may reduce risk:

  - After positioning the retractors, ensure visually and by direct palpation that psoas muscle is not entrapped between the blade and the pelvic side wall
  - Use the shallowest retractor blade sufficient to provide adequate exposure (degree of nerve injury is proportional to blade length)
  - Use rolled up laparotomy pads to cushion retractor blades against pelvic side wall
  - Retractor blade position should be monitored intermittently and re-adjusted accordingly
  - Hand-held retractors should be selected over self-retaining wherever possible
- **Correct preoperative positioning:**
  - Correct preoperative positioning in lithotomy stirrups, so hip and knee are moderately flexed, hip minimally abducted and externally rotated. Stirrups or boots should be at equal height
  - Excessive movement around the hip joint should be avoided since they may result in stretch and/or compression of the sciatic and femoral nerves.
  - Common peroneal nerve injury can be avoided by placing paddings between the lateral fibular heads and the stirrup
  - Shoulder braces, if used, should be positioned over the acromio-clavicular joint to prevent brachial plexus injury
  - Upper arm should be pronated, and padding should be adequately draped over the postero-medial elbow. This prevents ulnar nerve compression against the operating table
  - Arm boards should be placed at an angle not more than 90 degrees from the long axis of the table
- **Proper abdominal incision:**
  - Extending abdominal incision beyond the lateral margins of the rectus muscles should be avoided (to avoid ilioinguinal and iliohypogastric nerve injury)
  - If a wide incision is necessary, it should be curved upward to avoid nerve course
  - During fascial closure of low abdominal incisions, care must be taken not to incorporate tissue more than 1.5 cm away from the fascial edge

Uterine Perforation

Incidence

General incidence	• 0.002% - 1.7%
Hysteroscopy	• 1.6% (general incidence) • Division of intrauterine adhesions: 0.8-1.8%. • Hysteroscopy for postmenopausal bleeding: 0.2-2%.
Intrauterine device placement	• 0.1% • 15% of cases are associated with abdominal/pelvic viscera injury • 3-7.5% are associated with bowel injury
Termination of pregnancy	• 0.5% (elective termination of pregnancy) • 9% of cases end in hysterectomy

Most common location

- Anterior wall (40%)
- Cervical canal (36%)
- Fundus - the least common (13%)

Most common instrument

- Suction cannula (50%)
- Hegar dilator (25%)

Most serious location

Perforation of the internal os and lower uterus (vs. uterine body) because it is often lateral, and therefore, it may involve uterine vessels

Risk factors

- **High risk surgery:**
  - Most common procedures are surgical termination of pregnancy (TOP) and evacuation of retained products of conception (ERPC)
  - Risk is doubled in 2nd trimester compared to 1st trimester
  - Postpartum evacuation of ERPC in women with postpartum haemorrhage is associated with 5% risk of perforation
- **Uterine characteristics:**
  - Tight cervix
  - Postmenopausal uterus
  - Acute anteversion, retroversion or retroflexion
  - Parous uterus
- **Uterine abnormalities:**
  - Infection & pyometra.
  - Intrauterine adhesions.
  - Uterine anomalies.
- **High risk surgeons:**

  There is 5-fold increase in risk of perforation when the procedure is conducted by junior staff

Diagnosis

- Passage of an instrument beyond anticipated length of the uterus
- Loss of resistance to instrumentation passage
- Sudden loss of vision due to sudden loss of fluid during hysteroscopy
- Noticeable bleeding
- Collapse

Prevention

Preoperative measures

- Medical rather than surgical termination of pregnancy in 2nd trimester, whenever possible
- Bimanual examination prior to surgery
- Experienced surgeon
- Cervical preparation with prostaglandins or misoprostol (not beneficial in postmenopausal): consider oral or vaginal cervical preparation prior to procedure

Intraoperative measures

- Adequate and gradual cervical dilation, use half sized dilators, avoid excessive force.
- Use of Hawkins-Ambler dilators (less force than Hager dilators)
- Ultrasound or laparoscopic guidance

Management

If perforation is caused by a dilator up to 5 mm, a curette, coil insertion or polyp forceps

- Conservative management
  - Admission
  - Administration of IV antibiotics
  - Close observation for 24 hours. This includes observation of vital signs and bowel sounds
  - Patients can be dismissed home if they remain asymptomatic after 24 hours

* Bowel sounds may be initially present as peritonitis may take days to develop

If perforation is caused by larger instruments, tissues grasped, avulsion attempted, or bleeding is present **OR** If perforation occurs while using laser or activated resection loop or during TOP or ERPC

- Laparoscopy
  - Small perforation with slight bleeding
    - No further action is needed. Cauterization may be used to control small bleeders
    - The procedure can be completed under laparoscopic visualization
  - Large perforation
    - A large perforation may be sutured via laparoscopy, an experienced surgeon may be called to perform the procedure. Laparotomy may be done if an experienced colleague is not available
  - Active bleeding or large hematoma
    - Perform laparotomy
    - Assistance from a urologist or a general surgeon may be needed
    - Hysterectomy: may be performed in a few cases. However, most hysterectomy cases are associated with delayed diagnosis

Gynecologic surgery

Abstract

Surgery is a major part of obstetrics and gynaecology practice, and surgical skills are mandatory in all subspecialties including oncology, urogynecology, infertility, obstetrics, and fetal medicine. In addition to practical training, principles of surgery, surgical complications, and postoperative care should be clearly understood. In this chapter, we will discuss general principles of surgery, postoperative care and will cover common surgical complications, their diagnosis, and how to manage these complications.

Keywords

Hysterectomy, laparoscopy, hysteroscopy, postoperative complications

Further readings

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